

FIG. 1

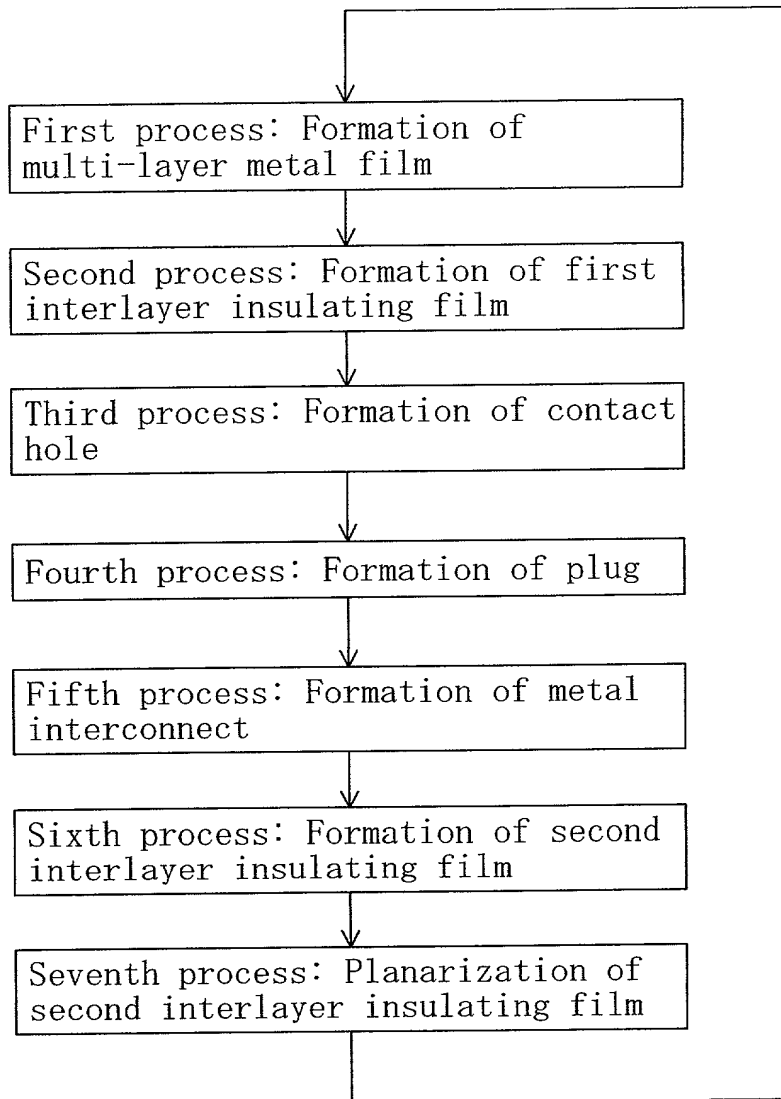


FIG. 2

First process: Formation of  
multi-layer metal film

- (1) Formation of first barrier metal layer
- ↓
- (2) Formation of first metal film
- ↓
- (3) Formation of second barrier metal layer
- ↓
- (4) Formation of second metal film
- ↓
- (5) Formation of diffusion preventing film

FIG. 3

Second process: Formation first  
interlayer insulating film

- (1) Formation of first interlayer insulating film

FIG. 4

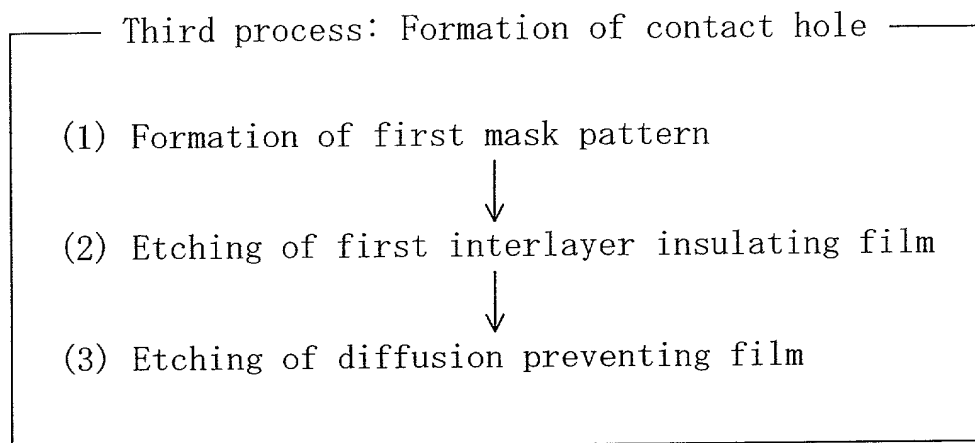


FIG. 5

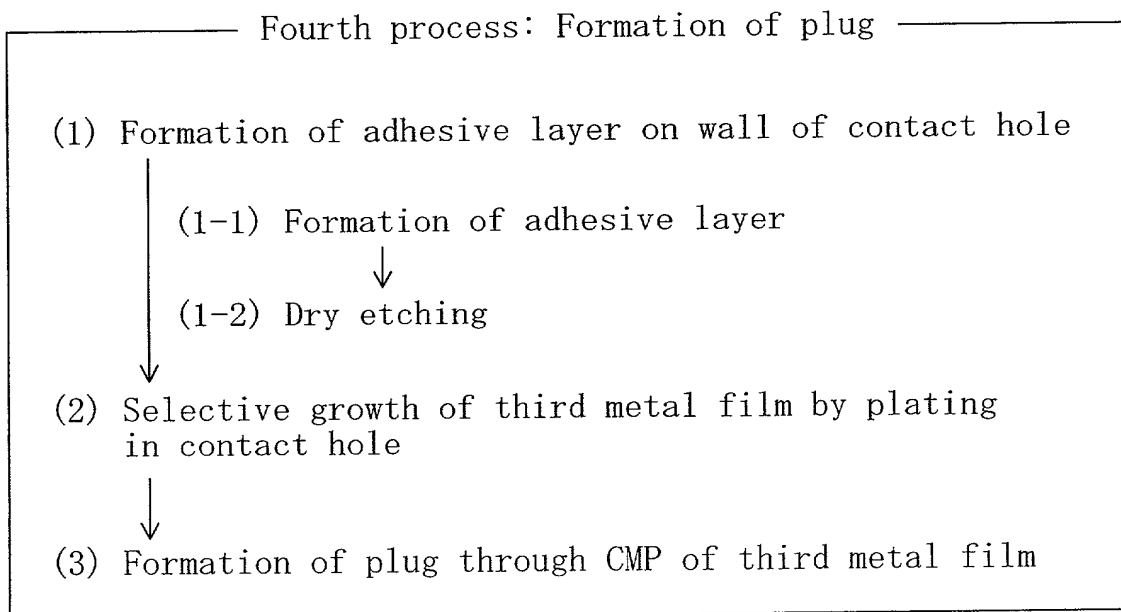


FIG. 6

Fifth process: Formation of metal interconnect

- (1) Etch back of part of first interlayer insulating film
- ↓
- (2) Formation of second mask pattern
- ↓
- (3) Etching of first interlayer insulating film
- ↓
- (4) Etching of diffusion preventing film
- ↓
- (5) Etching of second metal film
- ↓
- (6) Etching of second barrier metal layer
- ↓
- (7) Etching of first metal film
- ↓
- (8) Etching of first barrier metal layer
- ↓
- (9) Etch back of part of first interlayer insulating film

## FIG. 7

Sixth process: Formation of second interlayer  
insulating film

(1) Formation of second interlayer insulating film

## FIG. 8

Seventh process: Planarization of  
second interlayer insulating film

(1) Planarization by CMP

FIG. 9A

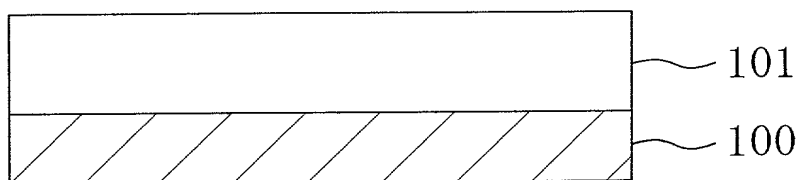


FIG. 9B

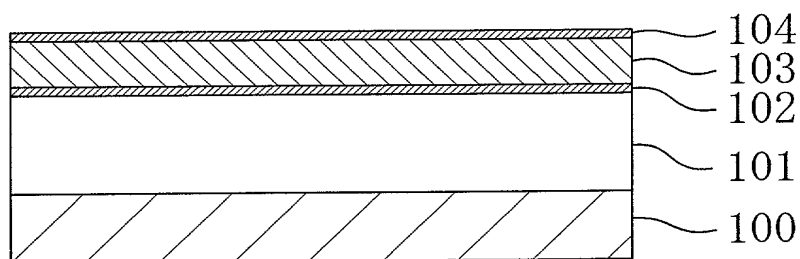


FIG. 9C

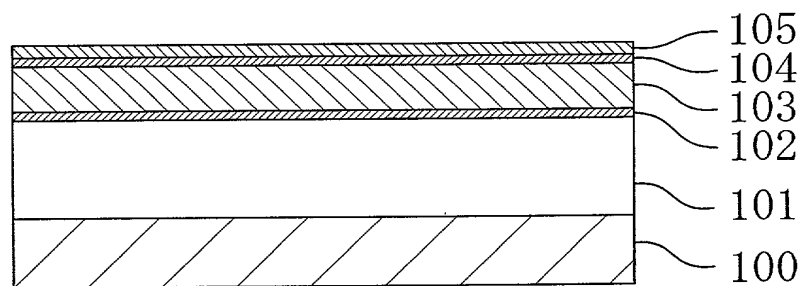


FIG. 9D

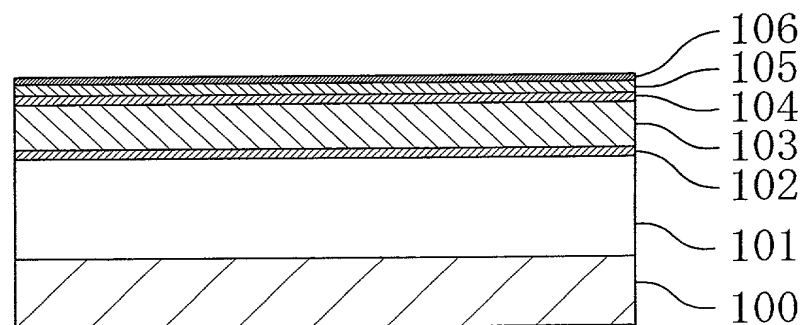


FIG. 10A

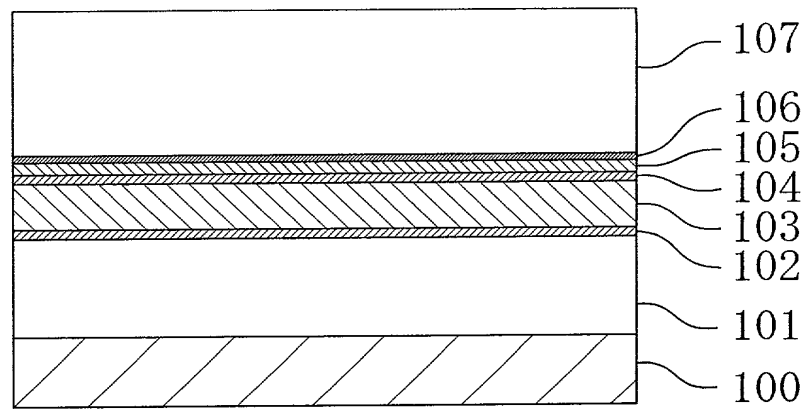


FIG. 10B

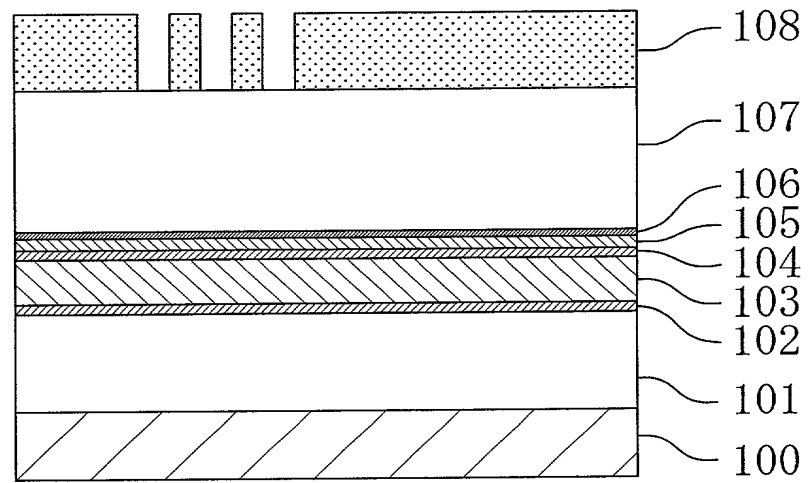


FIG. 10C

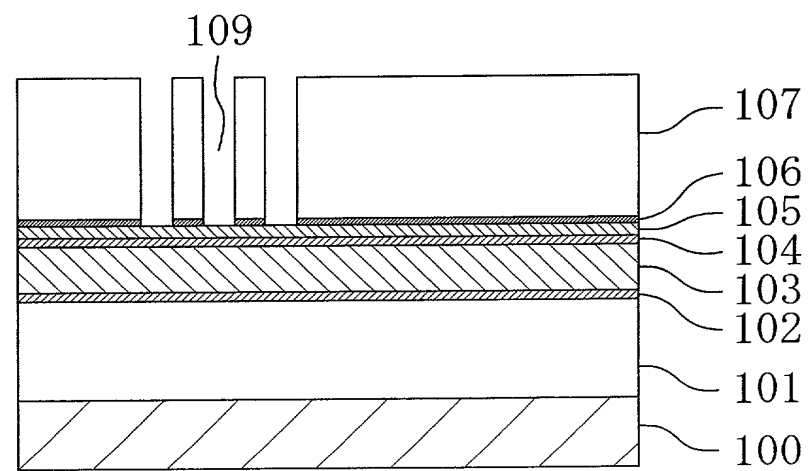


FIG. 11A

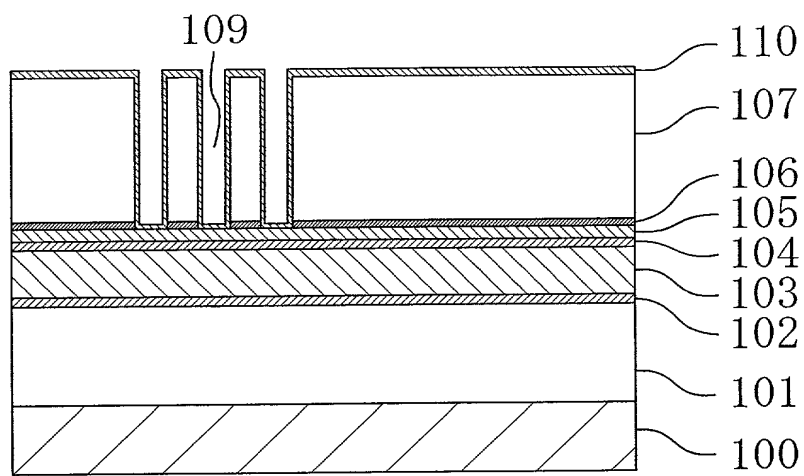


FIG. 11B

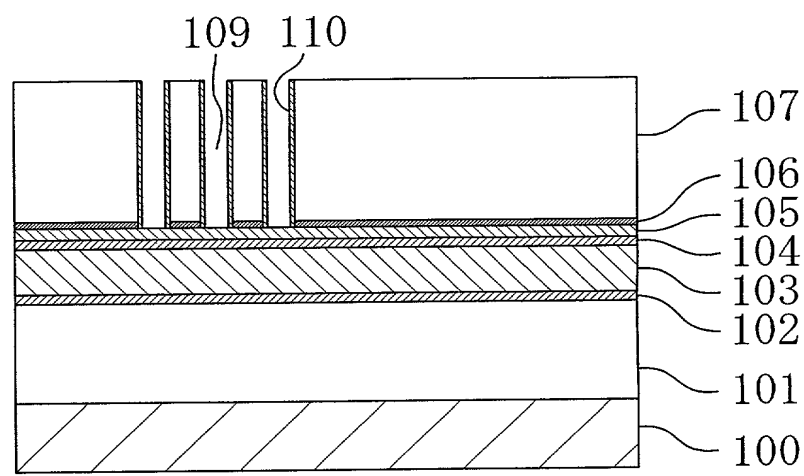


FIG. 11C

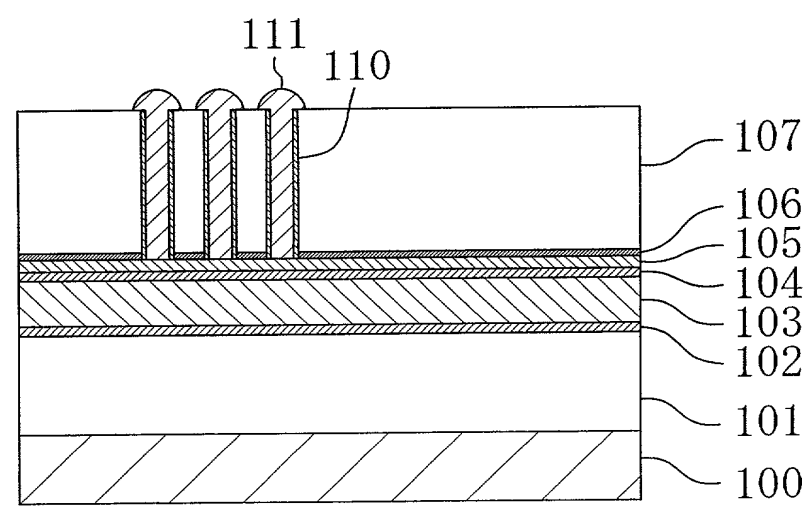




FIG. 12A

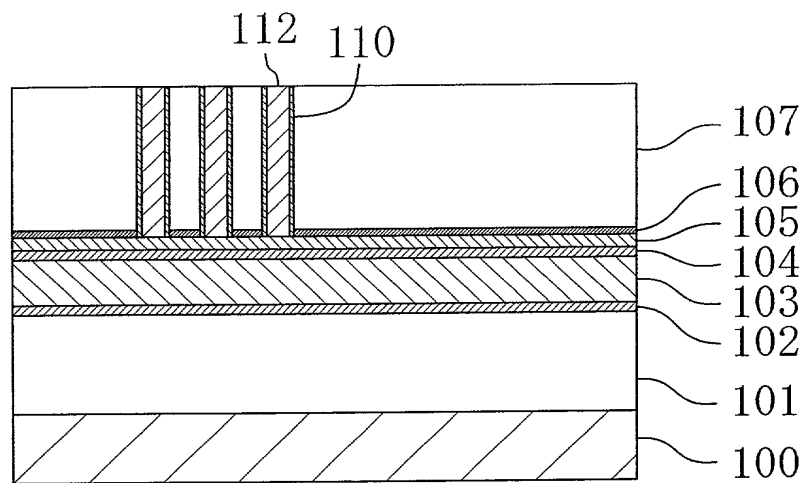


FIG. 12B

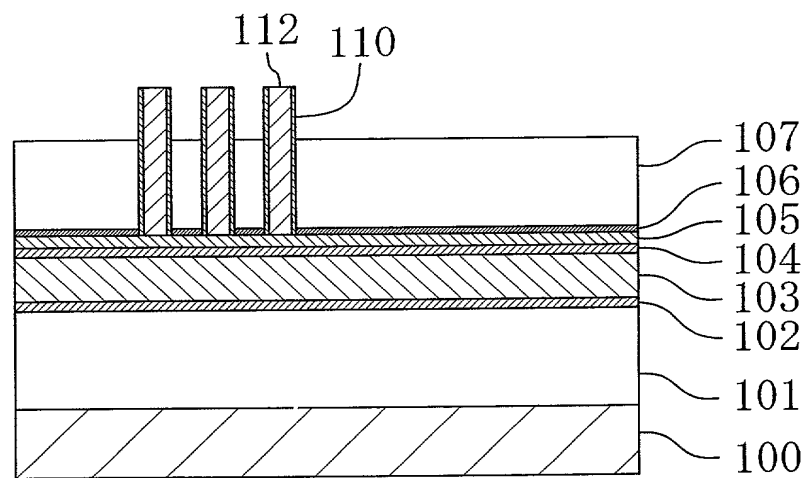
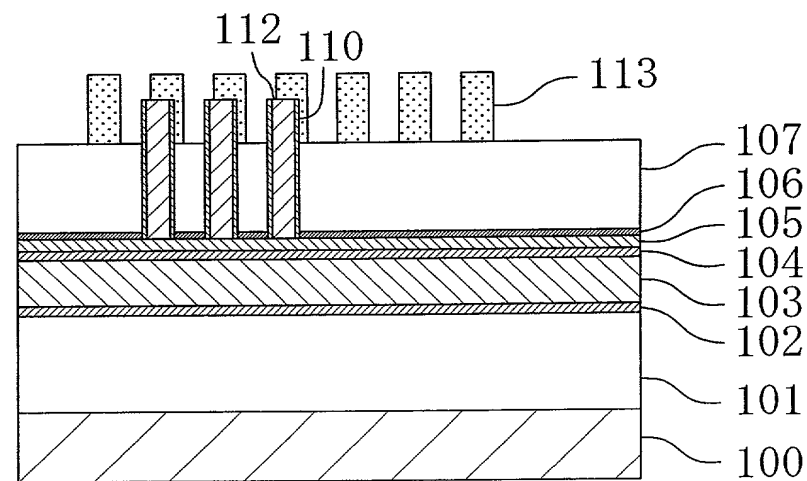


FIG. 12C



This diagram shows a cross-sectional view of a semiconductor device. The structure consists of several layers and features:

- 100**: A bottom substrate layer with diagonal hatching.
- 101**: A layer above the substrate, also with diagonal hatching.
- 102**: A thick, uniform white layer.
- 103**: A thin layer with diagonal hatching.
- 104**: A thin layer with diagonal hatching.
- 105**: A thin layer with diagonal hatching.
- 106A**: A thin layer with diagonal hatching.
- 107A**: A thin layer with diagonal hatching.
- 113**: A thin layer with diagonal hatching.
- 110**: A thin layer with diagonal hatching.
- 112**: A thin layer with diagonal hatching.

A cross-sectional view of a semiconductor device. The substrate consists of four layers: 100 (bottom, diagonal hatching), 101 (white), 102 (white), and 103 (thin, diagonal hatching). Layer 104 is a thick layer with diagonal hatching. On top of layer 104, there are several vertical structures. From left to right: a dotted layer 113, a hatched layer 110, a hatched layer 112, a dotted layer 113, a hatched layer 110, a dotted layer 113, a hatched layer 110, and a dotted layer 113. The hatched layers 110 and 112 are labeled with arrows pointing to their respective layers. The dotted layers 113 are labeled with arrows pointing to their respective layers. The labels 107A, 106A, and 105A are also present, pointing to the dotted layers 113, the hatched layers 110, and the hatched layers 112 respectively.

This cross-sectional view shows a substrate 100 with a hatched pattern. A layer 101 is deposited on the substrate. On top of layer 101, there is a series of stacked layers labeled 102A, 103A, 104A, 105A, 106A, and 107A, which are collectively indicated by bracket 114. These layers form a series of vertical structures. One of these structures is specifically labeled 110, and a portion of it is labeled 112.

FIG. 14A

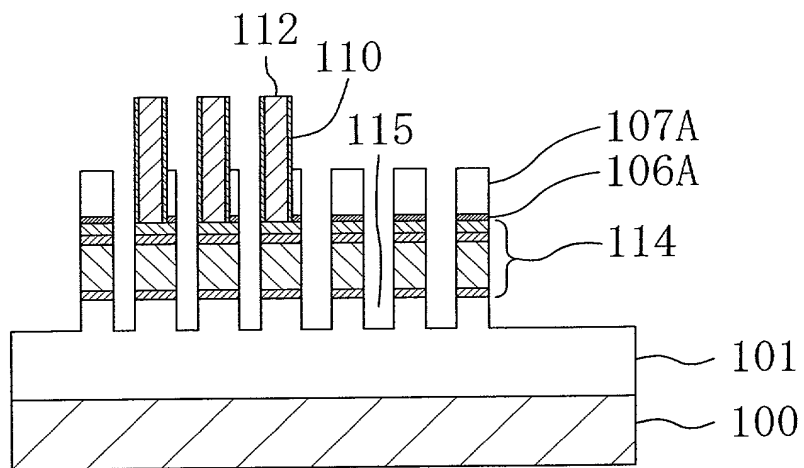


FIG. 14B

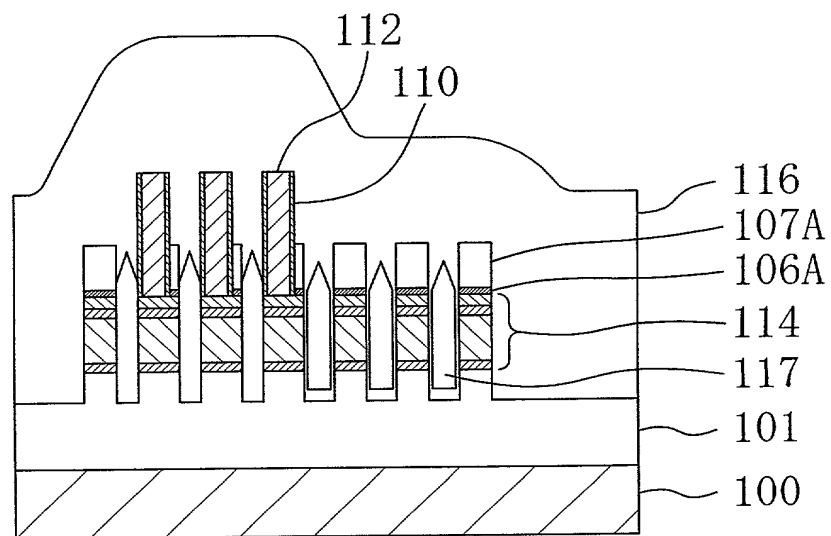


FIG. 14C

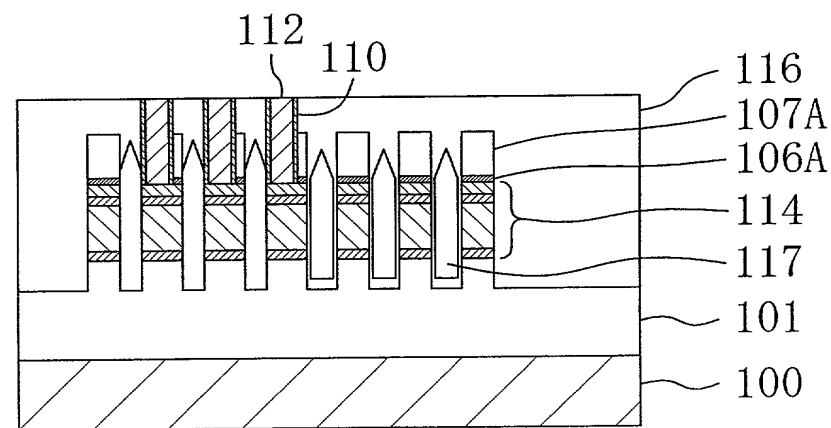


FIG. 15

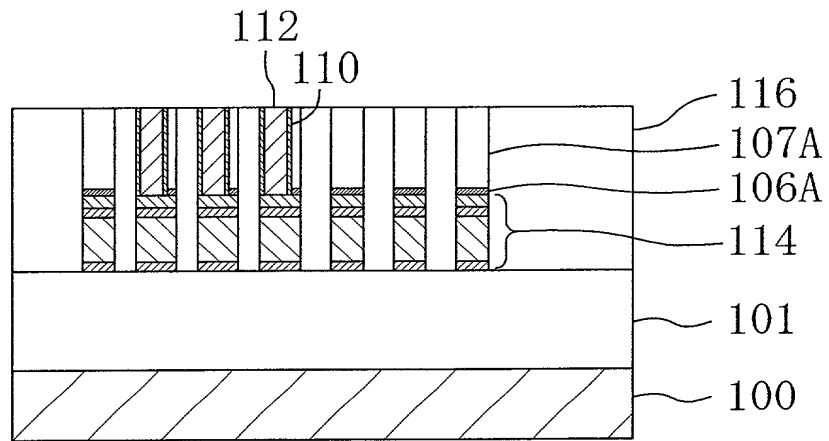


FIG. 16A

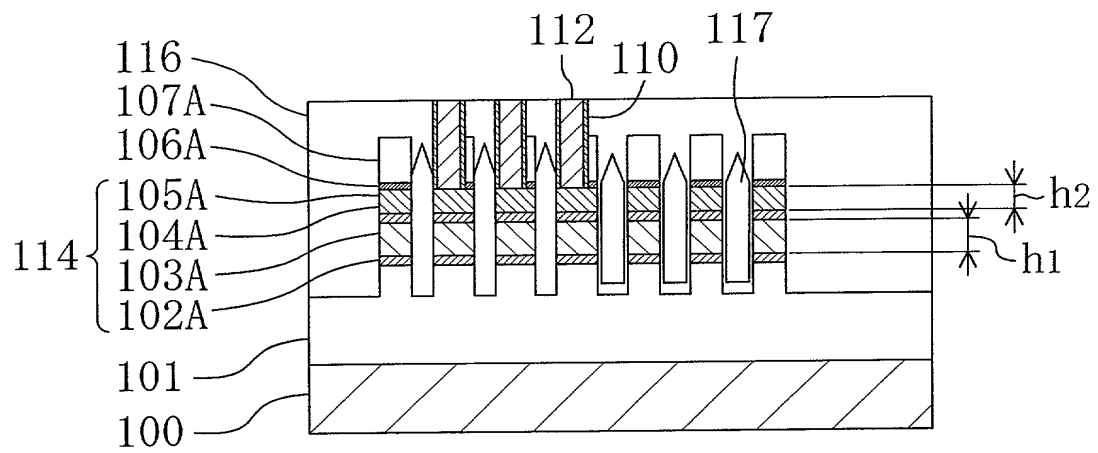


FIG. 16B

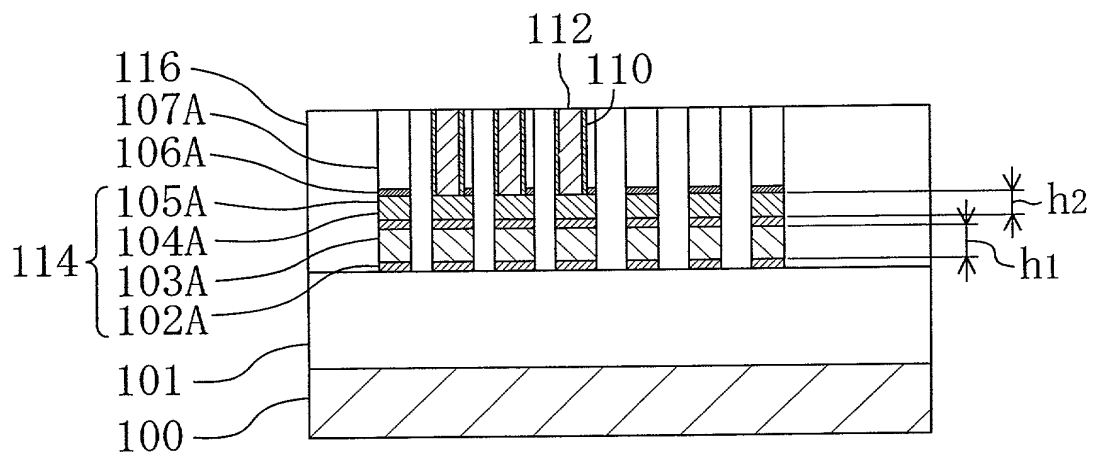


FIG. 17A  
PRIOR ART

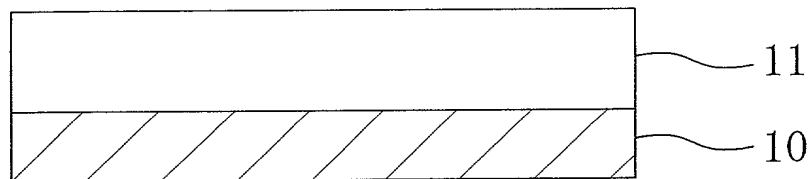


FIG. 17B  
PRIOR ART

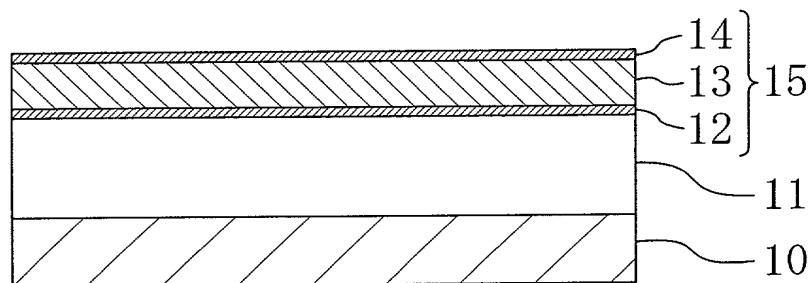


FIG. 17C  
PRIOR ART

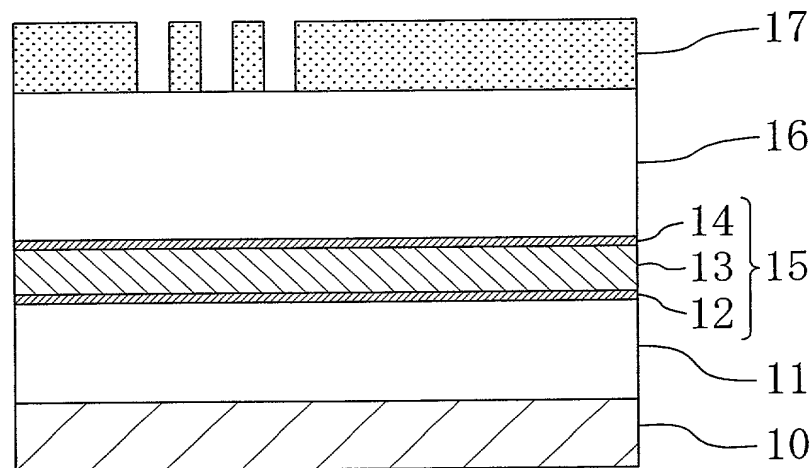


FIG. 17D  
PRIOR ART

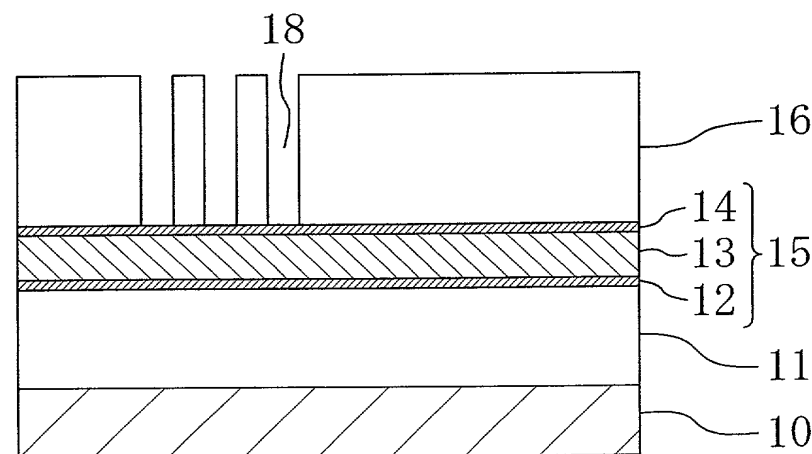


FIG. 18A  
PRIOR ART

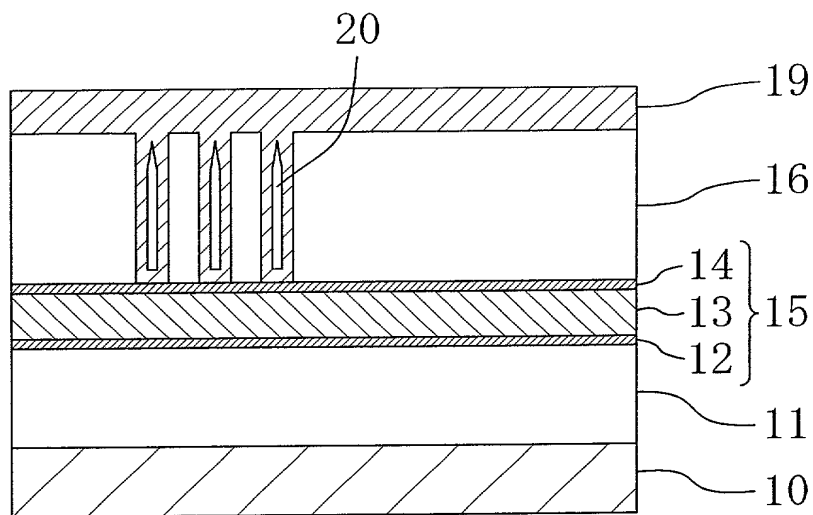


FIG. 18B  
PRIOR ART

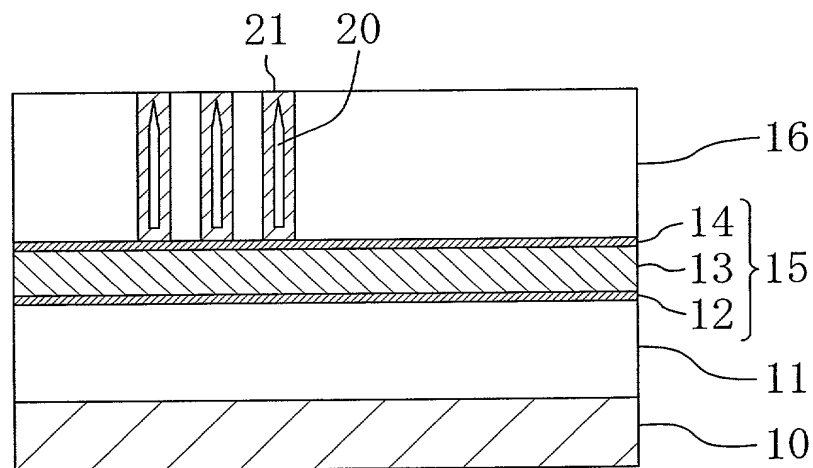


FIG. 18C  
PRIOR ART

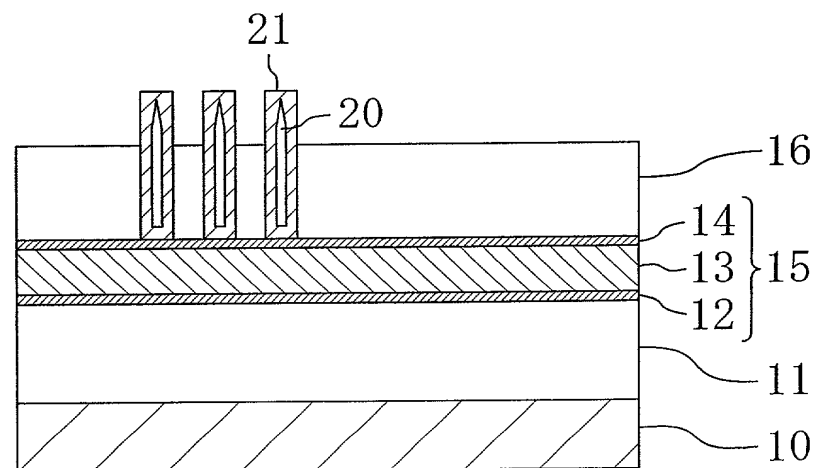


FIG. 19A  
PRIOR ART

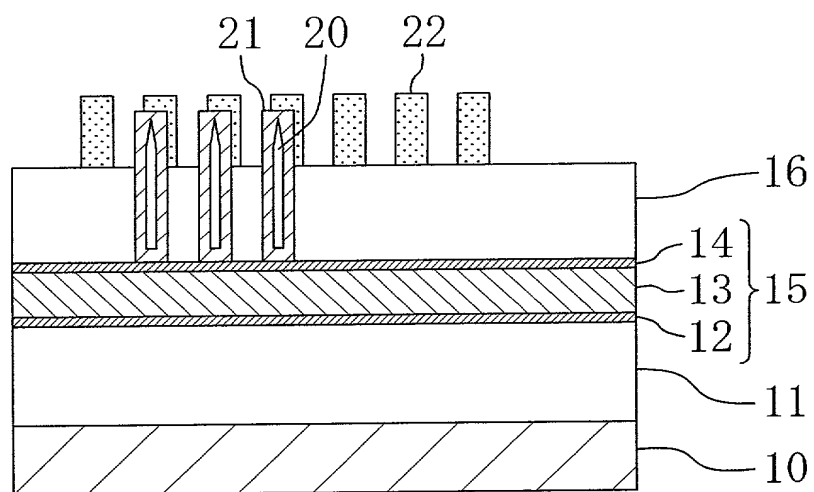


FIG. 19B  
PRIOR ART

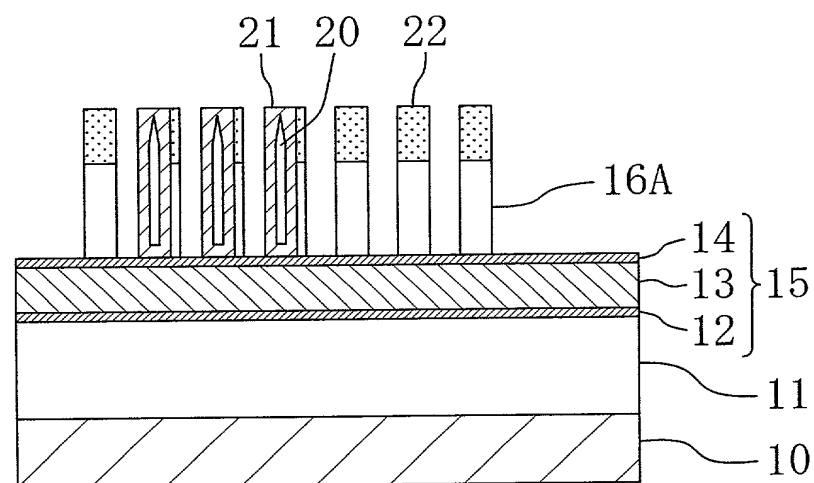


FIG. 19C  
PRIOR ART

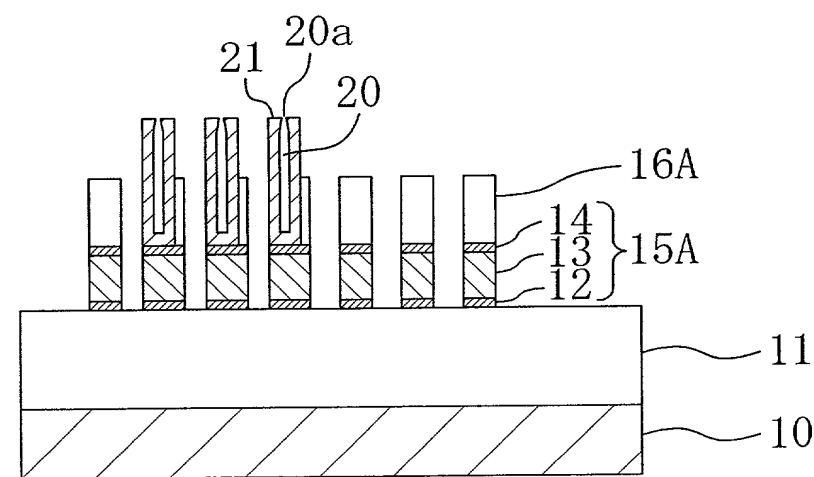




FIG. 20A  
PRIOR ART

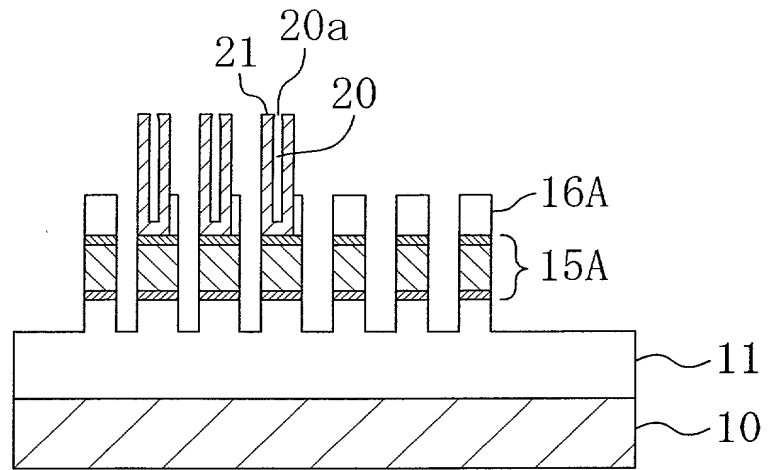


FIG. 20B  
PRIOR ART

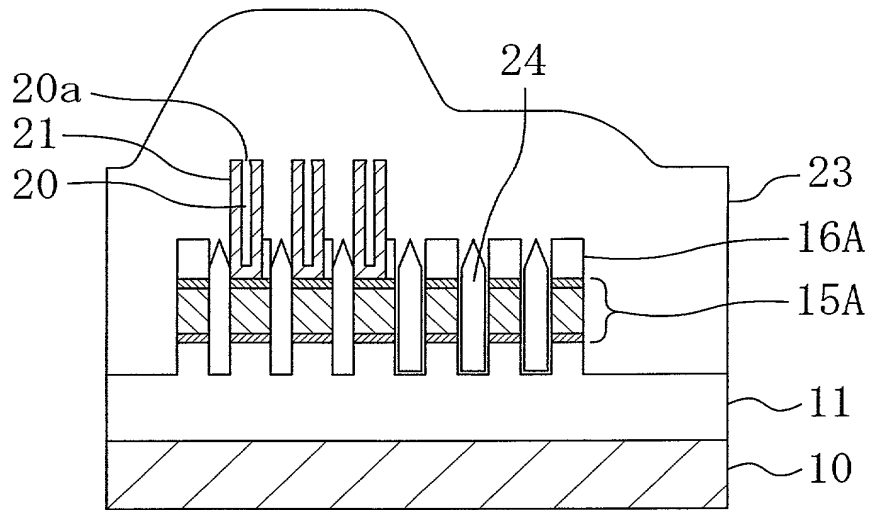


FIG. 20C  
PRIOR ART

